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- Brooks, Ian  
Lake Barrington Illinois 60010 (US)
- Loeschen, Michael D.  
Hawthorn Woods Illinois 60047 (US)
- Sheridan, Lee A.  
Barrington Illinois 60010 (US)
- Velan, G. Michael  
Mount Prospect Illinois 60056 (US)

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(71) Applicant: **ILLINOIS TOOL WORKS INC.**  
**Glenview, Illinois 60025 (US)**

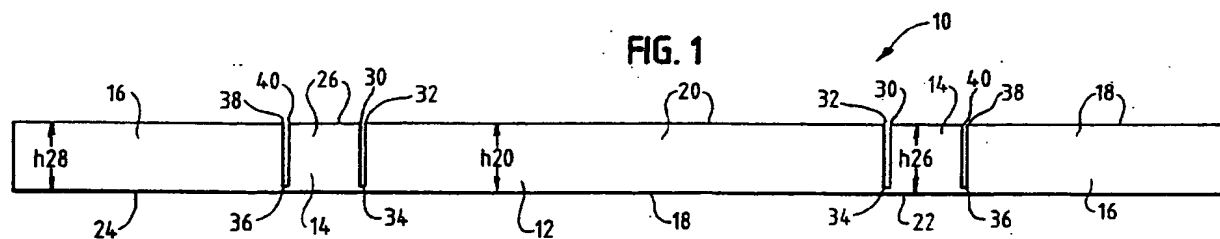
(72) Inventors:  
• Gosis, Anatoly  
Palatine Illinois 60067 (US)

(74) Representative: **Rackham, Stephen Neil**  
**GILL JENNINGS & EVERY,**  
**Broadgate House,**  
**7 Eldon Street**  
**London EC2M 7LH (GB)**

**(54) Packaging container**

(57) A packaging container (10) is formed from a single preformed, rigid unit of U-shaped cross-section having a generally flat bottom wall (18). The unit forms two end closures from first (14) and second (16) closure panels extending from both ends of a main body portion (12). The closure panels (14,16) are separated from the main body portion (12) and each other by first and second fold lines (12,14,26). The main body (12) side walls have straight-cut corners (32) at junctures with the first

closure panels (14), and the first closure panels (14) side walls have straight-cut corners (30) adjacent to the main body (12), forming square corners when folded. The first closure panels (14) side walls also have straight-cut corners (40) adjacent to the second closure panels (16), and the second closure panels side walls (16) have straight-cut corners (38) adjacent to the first closure panels (14), forming square corners when folded to form the end closures.

**FIG. 1****BEST AVAILABLE COPY**

## Description

**[0001]** The present invention is directed to a packaging container. More particularly, the present invention pertains to a packaging container having self-formed end closures, created from a single piece of material.

**[0002]** Packaging for lengthy items takes many forms. One construction includes a pair of corrugated, laminated paperboard top and bottom U-shaped channels configured for one to fit within the other. Most packages formed in this manner require separated end closures or caps, usually manufactured from cardboard or wood. These caps generally are stapled to adjacent package walls. Not only does this method necessitate close-fit manufacturing, but it is also very cumbersome at installation, and may cause content damage due to incompletely formed or off-positioned staples.

**[0003]** In another variety of packaging container, one of the top and bottom U-shaped channels has a notch cut into opposing side walls of the "U," so that the "U" portion may be folded over at a 90 degree angle. In such a configuration, channel ends are closed by the folded base portion and the side walls of the "U," which are folded over adjacent side walls. To seal such a package, tape or a like strip-type adhesive sealant must be extended over the flaps that then are folded over the adjacent side walls. Even though a seal may be formed, however, openings may remain at the juncture of the folded-over base portion and the cover portion, seriously weakening the package. This design is disclosed in U.S. Pat. No. 4,976,374, which is incorporated herein by reference.

**[0004]** Another existing packaging container, disclosed in U.S. Pat. No. 6,382,447, resolves the above-referenced problems by providing a packaging container in which the entirety of the end closure is formed from the packaging material itself. However, the container base unit, which forms end closures for the packaging container, features mitered corners. These mitered corners require complex die-cutting with mirrored tools, and mandatory strapping at specific positions to restrain the miter flaps.

**[0005]** Accordingly, there exists a need for a single-piece packaging container cut without miters in which the entirety of the end closures are formed from the packaging material itself. Desirably, the container's end closures meet or overlap along the container's main body portion, providing a high degree of structural strength and package integrity while requiring only a central tape sealing. Such a configuration allows for no gaps at its closure locations. Most desirably, the container may be prepared simply by making two straight saw-cuts on each package end.

**[0006]** A packaging container includes a preformed, rigid unit of U-shaped cross-section having a main body portion with a generally flat bottom wall and opposing side walls. The unit forms two end closures, at each end of the packaging container. Each end closure is formed

from a first closure panel extending from and adjacent to an end of the main body portion, and a second closure panel extending from and adjacent to an end of a first closure panel. The main body portion and the first closure panels are separated from one another by first fold lines. The first closure panels and the second closure panels are separated from one another by second fold lines.

**[0007]** For purposes of the present disclosure, the package material, although defined as having a U-shaped cross-section is, in fact, formed from a material having a channel-like or squared U-shape having a flat or near-flat bottom wall. The corners may be formed having a radius of curvature (i.e., rounded) or they may be formed having relatively sharp angles. However, again, for purposes of the present disclosure, the container material is referred to as "U-shaped".

**[0008]** The main body portion side walls have straight-cut corners at their junctures with the first closure panel, and the first closure panels side walls have first straight-cut corners adjacent to the main body. The first closure panels side walls additionally have second straight-cut corners adjacent to the second closure panels, and the second closure panels have straight-cut corners adjacent to the first closure panels.

**[0009]** The first closure panels are configured for folding generally perpendicular to the main body bottom wall, and the second closure panels are configured for folding generally perpendicular to the first closure panels and generally parallel to the main body bottom wall.

**[0010]** In a preferred embodiment, the main body side walls are about equal in height to the first and second closure panels side walls. Preferably, the first and second closure panels side walls are configured for insertion inside the main body side walls when the end closures are formed. Most preferably, each second closure panel is at least half as long as the main body portion.

**[0011]** These and other features and advantages of the present invention will be apparent from the following detailed description, in conjunction with the appended claims.

**[0012]** Particular embodiments in accordance with this invention will now be described with reference to the accompanying drawings; in which:-

FIG. 1 is a side view of an embodiment of the single-piece packaging container with straight-cut end closures constructed in accordance with the principles of the present invention, the container being shown with its first and second closure panels laid open, prior to folding and securing;

FIG. 2 illustrates the folding in-progress of the end closures of FIG. 1;

FIG. 3 is a bottom view of an embodiment of the packaging container, the container being shown in a fully constructed or assembled form and further shown with its second closure panels overlapping;

FIG. 4 is a side view of a device for straight-cutting

and embossing U-shaped packaging crates, the device being shown in its at-rest position;

FIG. 5 illustrates the movements of the device of FIG. 4;

FIG. 6 is an alternate side view of the device of FIG. 4, the device being shown in its at-rest position; and FIG. 7 illustrates an indentation in a packaging crate resulting from use of the device.

**[0013]** Referring now to the figures and in particular FIG. 1, there is shown a packaging container 10 embodying the principles of the present invention. The packaging container is formed in an U-shaped cross-section. Preferably, the packaging container is formed from laminated paperboard material. The packaging container includes a main body portion 12, first closure panels 14, and second closure panels 16. The straight-cut first and second closure panels 14, 16 are formed from an extension of the main body portion 12. The main body portion 12 has a generally flat bottom wall 18 and upstanding side walls 20. The first and second closure panels 14, 16 also have bottom walls 22, 24 and upstanding side walls 26, 28. Again, those skilled in the art will appreciate that although the container is referred to as "U-shaped", the package is actually formed from a channel-like structure having a flat or near-flat bottom wall 18.

**[0014]** The first closure panels 14 are formed adjacent to and at either end of the main body portion 12. The side walls 26 of the first closure panels 14 have first straight-cut corners 30. The main body side walls 20 also have straight-cut corners 32, immediately adjacent to the first panels' straight-cut corners 30. First fold lines or creases 34 can be formed between the main body bottom wall 18 and the first closure panels' bottom walls 22 at the junctures of the straight-cut corners 30, 32 to facilitate folding.

**[0015]** The second closure panels 16 are adjacent to the first closure panels 14. The second closure panels 16 are separated from the first panels 14 by second fold or crease lines 36 formed between the first closure panels' bottom walls 22 and the second closure panels' bottom walls 24, parallel to the first fold lines 34. The side walls 28 of the second closure panels 16 include straight-cut corners 38 at the junctures with the first closure panels 14. The side walls 26 of the first closure panels 14 include second straight-cut corners 40 adjacent to the second closure panels 16. The height  $h_{20}$  of the main body side walls 20 is about equal to the heights  $h_{26}$ ,  $h_{28}$  of the first closure panels side walls 26 and the second closure panels side walls 28.

**[0016]** Referring to FIG. 2, assembling the package 10 is straightforward and readily carried out. The package 10 is placed on a surface, with the main body 12, and the first and second closure panels 14, 16 laid out flat. The articles to be packaged are placed in the main body portion 12. The first panels 14 are then folded upwardly, so that the first panels 14 are perpendicular to the bottom wall 18 of the main body portion 12. As the

first panels 14 are folded, their side walls 26 can be inserted between the main body side walls 20. The second panels 16 are then folded over, perpendicular to the first panels 14, so that the bottom walls 24 of the second panels 16 lie parallel to the bottom wall 18 of the main body portion 12. As the second panels 16 are folded, their side walls 28 can be inserted between the side walls 26 of the first panels 14.

**[0017]** FIG. 3 shows the package 10 fully assembled, with one second panel 16a overlapping the other second panel 16b.

**[0018]** Referring now to FIGS. 4-6, there is shown a device 104 for straight-cutting and embossing U-shaped packaging container sections 10, 210, 410. The device 104 includes a frame 106, having an upper embossing/guide assembly 108 and lower cutting assembly 110 mounted thereto. An exemplary U-shaped unit 112 with vertical side walls 114, 116 to be cut is positioned between the upper 108 and lower 110 assemblies. Preferably, the unit is supported by a bench or conveyor mechanism B. The unit 112 is centered and restricted from lateral movement by an adjustable centering arm 118, positioned outside of the cutting plane 120.

**[0019]** The upper assembly 108 includes a two-step air cylinder 122, tooled with dual embossing end-effectors 124, 126. A depth adjustment, such as the exemplary threaded element 128 vertically adjusts the position of the cylinder 122 to accommodate varying unit depths. The lower assembly 110 includes an air cylinder 130, includes two pairs of notching blades 132, 134 and an embossing return pad 136. Preferably, the embossing return pad 136 is made of a resilient material. In a preferred embodiment, the embossing return pad 136 is made of urethane.

**[0020]** Referring now to FIG. 4, at the start of the cutting cycle, both the upper 108 and lower 110 assemblies are clear of the unit 112. As a first step, following manual or automatic activation, the upper air cylinder 122 extends to a first pre-programmed depth 138, causing the end-effectors 124, 126 to come into contact with an internal bottom wall 140 of the unit 112. The end-effectors 124, 126 provide support for the crate bottom wall 140 and loosely fits between the vertical side walls 114, 116.

**[0021]** Once the device 104 senses that the first step is complete, the lower air cylinder 130 extends, causing the two pairs of notching blades 132, 134 to cut completely through the crate's vertical side walls 114, 116, leaving the crate's bottom wall 140 intact. As seen in FIG. 6, the end-effectors 124, 126 can include guides 127 formed as channels therein. The guides 127 provide a centering means to assure that the blades 132, 134 remain straight during the cutting cycle. As a third step, the two pairs of notching blades 132, 134 remain raised, causing the crate's bottom wall 140 to rest on the embossing return pad 136 (as seen in FIG. 5). Next, the upper air cylinder 122 extends to a second pre-programmed depth 142. The end-effectors 124, 126 therefore embed into the crate internal bottom wall 140, de-

forming the material into the embossing return pad 136. A resulting indentation 144, as see in FIG. 7, compresses the crate's bottom wall 140 along future bending lines, facilitating the formation of packaging containers. Finally, both the upper 108 and lower 110 segments return to their original positions, as in FIG. 4. As will be appreciated by those skilled in the art, the indentations form a region at which the material will more readily fold to form the container 10, 210, 410.

[0022] Advantageously, it has been found that the present device 104 can be used with container units 112 having a wide variety of wall 114, 116 heights with minimal to no adjustment. This increases the flexibility of the packager vis-A-vis selecting a proper package based upon the articles to be packaged, rather than a package for which the device is configured or designed.

[0023] In addition, it has been found that cutting rather than sawing the material provides a "cleaner" cut with respect to the ends of the material as well as debris that may be created during the cutting operation. It has further been found that the cutting blades 132, 134, moving toward the unattached (e.g., free-) ends of the walls 114, 116 prevents collapse of the walls 114, 116, regardless of the material thickness, during the cutting operation.

## Claims

### 1. A packaging container, comprising:

a preformed, rigid unit of U-shaped cross-section having a main body portion with a generally flat bottom wall and opposing side walls, the unit forming two end closures for the packaging container, formed from first closure panels extending from and adjacent to both ends of the main body, and second closure panels extending from and adjacent to both ends of the first closure panels, the main body and the first closure panels being separated from one another by first fold lines, the first closure panels and the second closure panels being separated from one another by second fold lines, the main body side walls having straight-cut corners at their junctures with the first closure panels and the first closure panels side walls having first straight-cut corners adjacent the main body, the first closure panels side walls having second straight-cut corners adjacent the second closure panels and the second closure panels side walls having straight-cut corners adjacent the first closure panels, the first closure panels being configured for folding generally perpendicular to the main body bottom wall and the second closure panels being configured for folding generally perpendicular to the first closure panels and generally parallel to the main body bottom wall.

2. The packaging container in accordance with claim 1, wherein the main body side walls have a height that is about equal to a height of the first and second closure panels side walls.

3. The packaging container in accordance with claim 1 wherein the first and second closure panels side walls are configured for insertion inside the main body side walls when the end closures are formed.

4. The packaging container in accordance with claim 1 wherein each second closure panel is half as long as the main body portion.

5. The packaging container in accordance with claim 1, 2 or 3, wherein the length of each second closure panel is greater than half of the length of the main body portion, creating an overlap when the container is assembled.

6. A packaging container, comprising:

a preformed, rigid unit of U-shaped cross-section having a main body portion with a generally flat bottom wall and opposing side walls, the unit forming two end closures for the packaging container, formed from first closure panels extending from and adjacent to both ends of the main body, and second closure panels extending from and adjacent to both ends of the first closure panels, the main body side walls being approximately equal in height to the first and second closure panels side walls, the main body and the first closure panels being separated from one another by first fold lines, the first closure panels and the second closure panels being separated from one another by second fold lines, the main body side walls having straight-cut corners at their junctures with the first closure panels and the first closure panels having first straight-cut corners adjacent the main body, the first closure panels side walls having second straight-cut corners adjacent the second closure panels and the second closure panels side walls having straight-cut corners adjacent the first closure panels, the first closure panels being configured for folding generally perpendicular to the main body bottom wall, the second closure panels being configured for folding generally perpendicular to the first closure panels and generally parallel to the main body bottom wall, the first and second closure panels being configured for insertion inside the main body side walls, and the length of each second closure panel being greater than half of the length of the main body portion, creating an overlap when the container is assembled.

7. A packaging container, comprising:

a preformed, rigid unit of generally U-shaped cross-section having a main body portion defined by a generally flat base wall and upstanding side walls extending upwardly from longitudinal sides of the base wall, the unit defining first and second end closure means formed from the main body at opposing ends of the main body, the first and second end closure means each including an end wall formed from a portion of the main body base wall and a cover base wall formed from a portion of the main body base wall, the main body base wall being contiguous with each of the closure means end walls which are contiguous with the cover base walls, the closure means formed by a pair of folds at the opposing ends of the main body enclosing a central portion of the main body, wherein the upstanding walls of the end closure means are inserted into a portion central of the U-shaped cross-section at the central portion of the main body.

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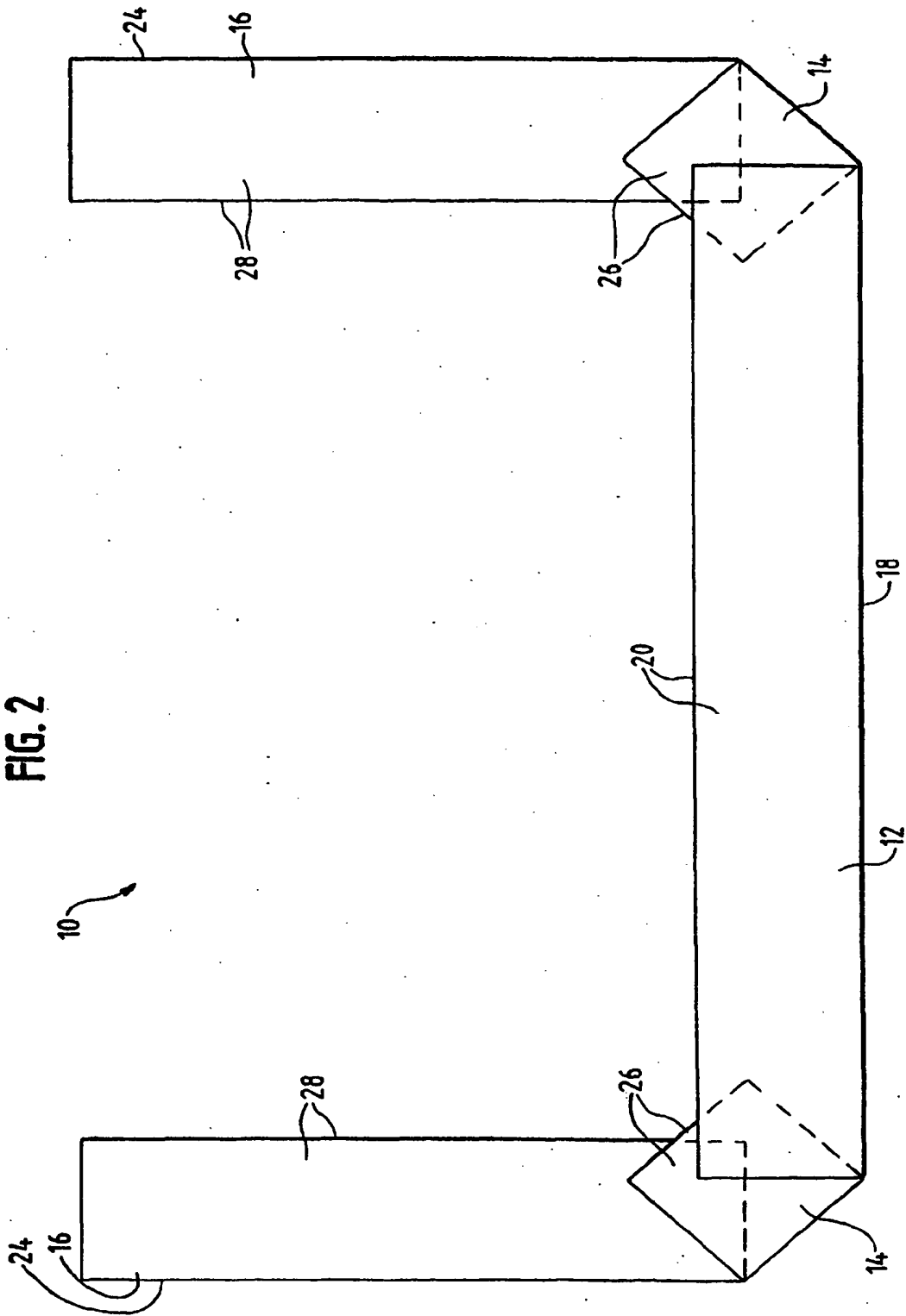
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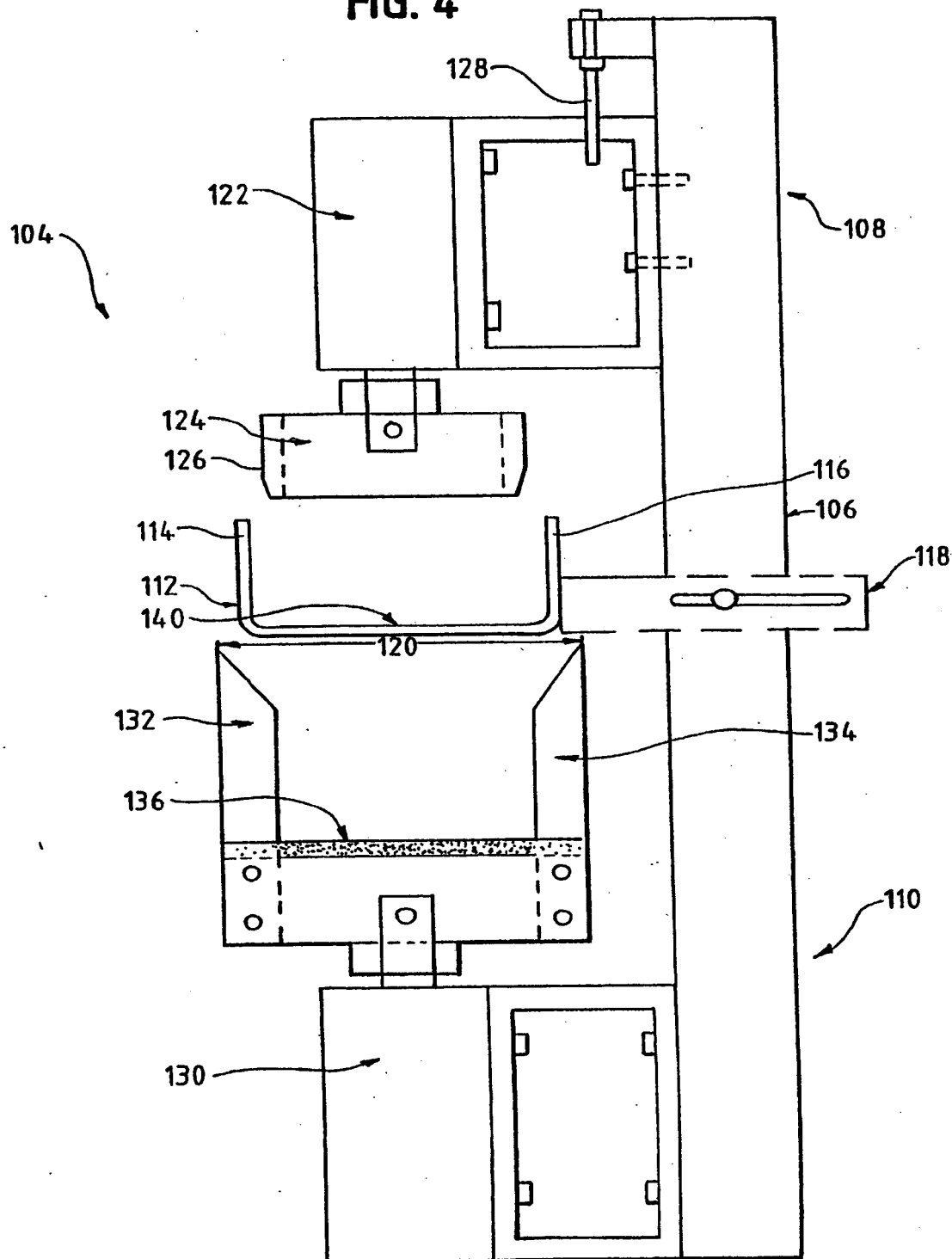


FIG. 2



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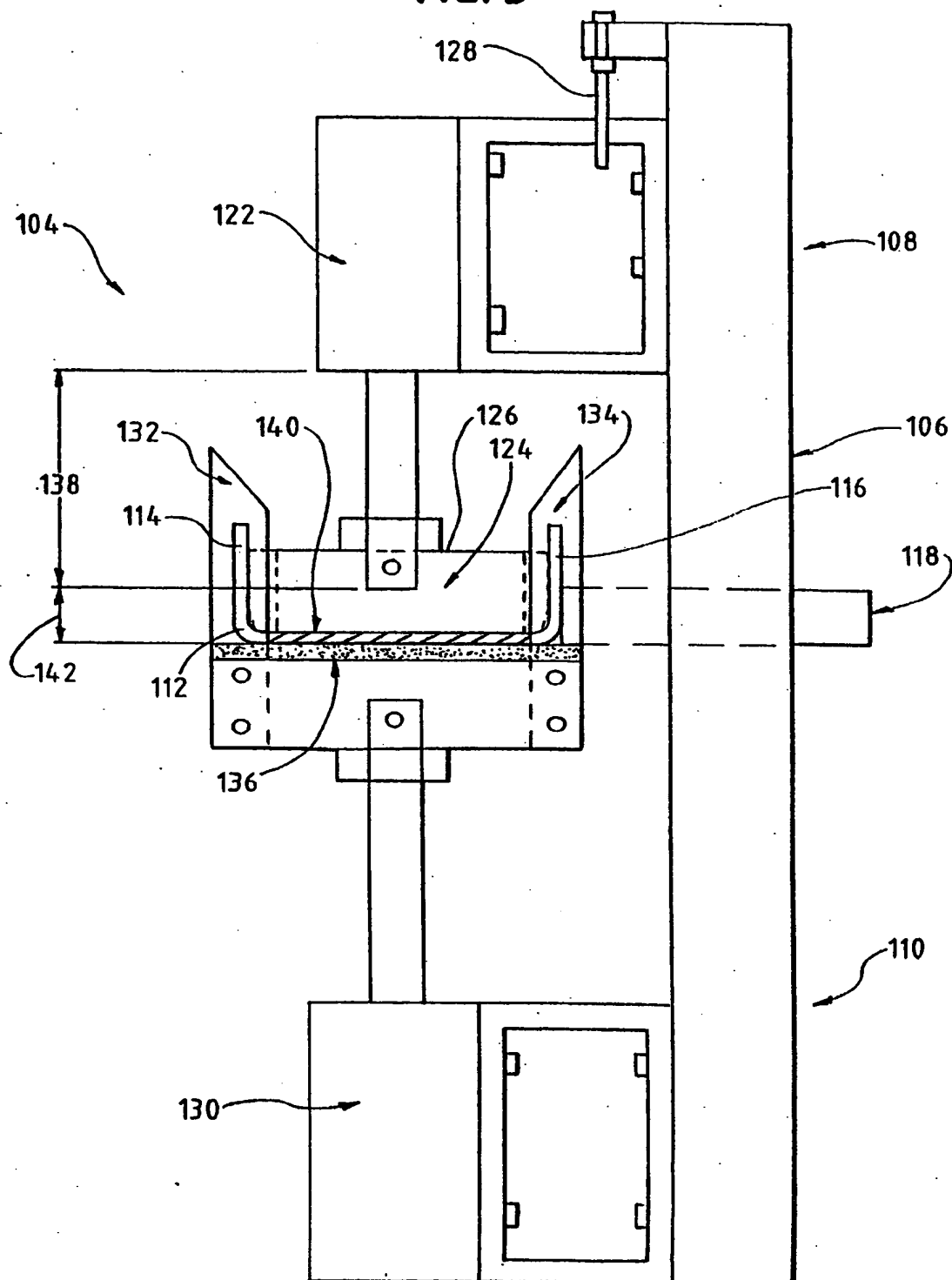
FIG. 4

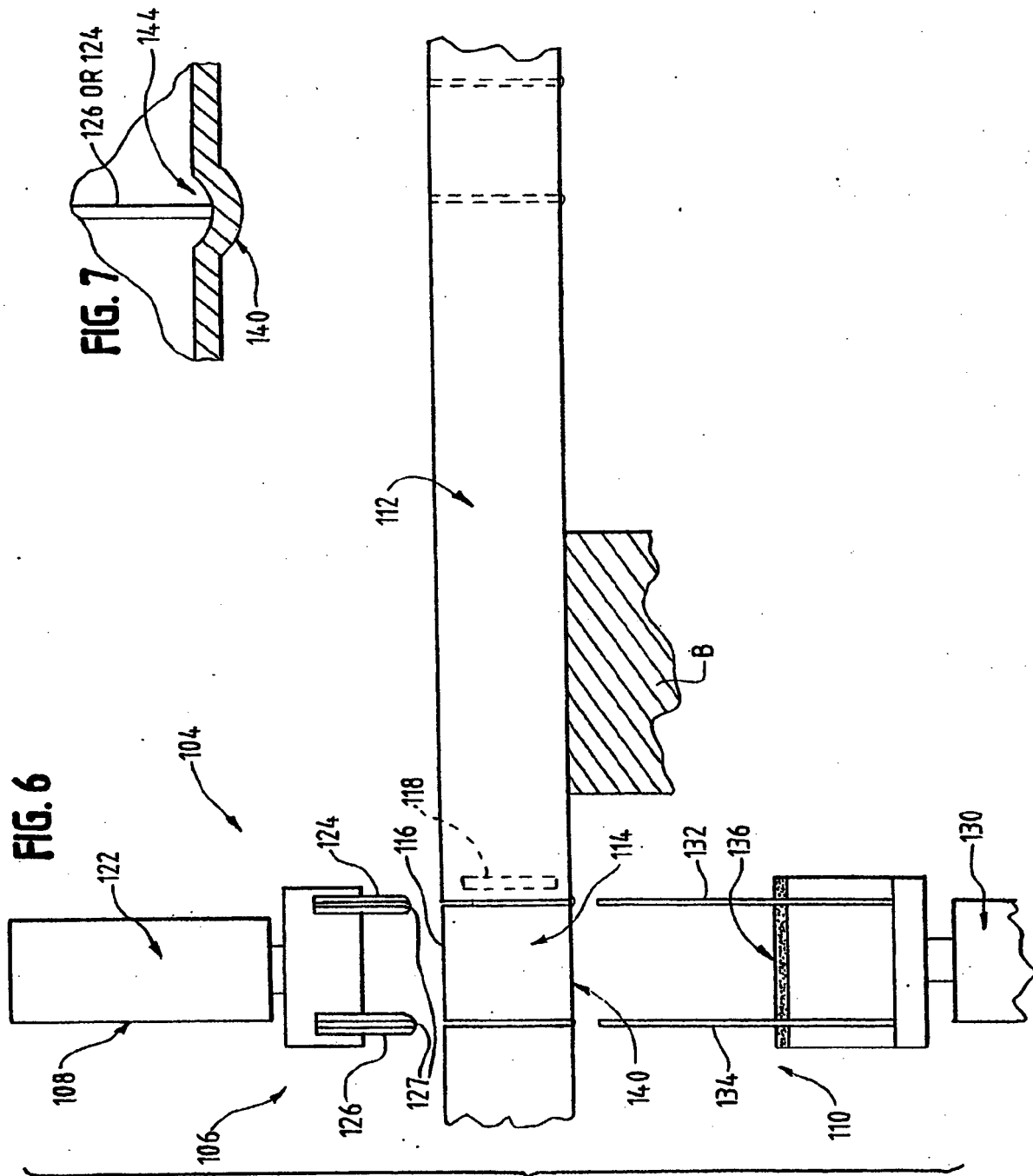


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FIG. 5





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Application Number  
EP 03 25 6134

14100

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 13 January 2004	Examiner Piolat, O
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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